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Research Laboratories

CARBIDE AND CARBON CHEMICALS CORPORATION

Oak Ridge, Tennessee

SPECIAL HAZARDS ACTIVITIES FOR MARCH AND APRIL, 1947

by

Clifford K. Beck

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DISTRIBUTION LIST

Special Hazards Committee:

S. C. Barnett ✓

C. K. Beck

C. E. Center

R. W. Cook

M. J. Costello

S. Cromer

G. T. Felbeck

A. P. Huber

W. B. Humes

F. W. Hurd

J. A. Marshall

M. G. Means

G. T. E. Sheldon

S. Visner

Consultants:

E. T. Booth

R. P. Feynman

P. Morrison

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AGENDA FOR MEETING OF K-25 SPECIAL HAZARDS COMMITTEE

April 18, 1947

Clifford K. Beck

S. C. Barnett
C. K. Beck
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R. W. Cook
M. J. Costello
S. Cromer
G. T. Felbeck
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F. W. Hurd
J. A. Marshall
M. G. Means
G. T. E. Sheldon
S. Visner

A meeting of the K-25 Special Hazards Committee is called for Friday morning, April 25, at 10:00 AM in the K-1001 Conference Room.

The items to be discussed are:

1. Scope of Special Hazard activities; requirements to be met.
2. Organizational structure.
3. Role of Consultants.
4. Problems to be handled by Hazards Committees.
5. Origin and approval of reports.
6. Actions thus far.
7. Projected activities.

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1. Scope of Special Hazard Activities; Requirements to be met.

The primary objective of all Special Hazard Activities is achievement of maximum safety in the Gaseous Diffusion Plant. The organization and functioning of all Special Hazard efforts aim toward reducing to a minimum the possibility of hazardous accumulation.

A second objective is to effect such an organization, staffed with adequate manpower, that all interested parties will be satisfied that a reasonable safety program is being alertly and aggressively pursued.

In particular, the stipulations and conditions listed by the A.E.C. and various investigating committees as requisites of safe operation of the plant under present conditions must be satisfied. Where specific recommendations cannot be carried out in detail, the substituted procedures should carry at least equal assurances of safety.

An organization and functional procedures for handling all matters involving possibilities of hazardous accumulations have been developed which are believed to insure adequate safety protection for the plant.

2. The organizational arrangement, personnel, and functional responsibilities of the Special Hazard set-up is shown in Appendix I, page 7.

There are four essential features of this plan:

a. A Director of Field Operations spends his full time in Special Hazard activities.

b. The Director of Field Operations is chairman of a "Fact Finding" committee, composed of representatives of the Major Divisions, whose duties consist mainly in maintaining constant vigilance over operations which involve possibilities of hazardous accumulations, studying proposed changes in design and operations, preparing detailed studies of existing facilities, etc., and reporting the results of their studies through their chairman to Approval Committees for decisions.

c. An Approval Committee, consisting of members thoroughly familiar with plant operations and with factors affecting critical accumulation, render decisions on matters involving plant safety, or pass on to a Consultant Committee of Special Hazards experts, matters requiring further consideration.

d. Plant Supervision, meeting at periodic intervals as a Special Hazard Committee composed of top supervision from the Major Divisions of the plant, is kept informed on all Special Hazards activities and, in turn, has the responsibility of deciding major policies and programs relating to Special Hazards in the plant.

3. Role of Consultants Committee

A Consultants Committee of Special Hazards experts has been formed. It consists of Drs. Nordheim, Snell, Greuling, Shapiro and Ray of Clinton Laboratories, appointed by the District Atomic Energy Commission, and Drs. Booth, Feynman, and Morrison on Consultants Contract with Carbide. Dr. Nordheim is serving as chairman of the committee.

The Consultant Committee's relationship to the plant should include two functions:

a. To furnish advice on assistance of problems referred to them for consideration. In this, the initiative rests with the K-25 group.

b. The committee should point out hazardous operations or situations overlooked by the K-25 group, and should offer criticisms or suggestions as necessary to effect optimum safety conditions in the plant. In this, the initiative rests with the consultants.

The responsibility for safe operation of the plant rests on Carbide; not on the Consultants Committee. But the assistance of the Consultants is expected to aid greatly in the discharge of that responsibility.

4. Problems to be Considered by the Special Hazards Organization.

It is intended that any equipment, procedure or operation involving handling of enriched uranium shall be subject to scrutiny by the Special Hazards Group.

Any equipment procedures or operations involving handling of radio-active material which could result in radiation hazard to personnel, including radio-active sources and decay products of uranium, is subject to scrutiny by the Special Hazards Group.

Any proposed change in equipment, procedure or operations involving the possibility of enriched uranium accumulation or handling of hazardous radio-active material must be studied in advance by the Special Hazards Group and approval given before the proposed change is put into effect.

The following is intended as a guide to the type of proposed changes which require prior approval:

1. All changes to the permanent volume of the Plant.

2. Raising cascade pressure, or lowering temperatures in the cascade.

3. Vacuum pumping on the cascade not now in general practice, specifically the following:

   a. Any vacuum pumping in Plant II other than the usual Beach-Russ pumps in the K-312 buildings where the C-616 mol percent is less than 0.1% and Line Recorder pumps.

   b. Any vacuum pumping in Plant I other than Line Recorder pumps, Cold Trap and Purge and Product Beach-Russ pumps and routine vacuum testing.

4. Introduction of contaminants into the cascade.

5. The attachment of any auxiliary or test equipment to the process piping of the cascade.

6. Changes in equipment in which C-616 is condensed, absorbed or withdrawn such as Cold Traps, Carbon Traps, and C-616 cylinders.

7. Changes in the seal systems from standard or emergency procedures that might affect the possibility of C-616 entering the seal exhaust lines.

8. Changes in instrumentation involving audible or visual indicators of cascade upsets; also changes in automatic equipment that correct cascade upsets as, for example:

   a. Datum and Seal exhaust alarms.

   b. Cell motor breakers and relays.

9. Changes in the maximum assay of material handled by the Cold Traps and Purge and Product Rooms in K-302-5.

10. All changes in emergency operating procedures.

11. Changes in operating practice that may lead to C-616 accumulations in any stage or stages; as for example, direct recycle operations without adequate provisions for relief of excessive pressures.

12. Process tests affecting the P.G. System.

13. All changes that may change appreciably the plant concentration gradient and building inventories of X.

14. Changes in the storage of material containing uranium enriched more than 1%.

15. All laboratory and development equipment and set-ups in which the "Always Safe" amount of uranium may be exceeded.

16. All changes in recovery operations.

17. All changes in handling of C-616 or radioactive materials that may lead to health radiation problems.

With respect to activities not covered in this list, it is the responsibility of the individual directing the activity to secure approval if the activity is of such a nature that involves Radiation Hazards consideration.

It is understood that any deviation from the approval requirement can only be sanctioned in the case of an emergency not covered by approved procedures. In that case, the individual directing the operation assumes full responsibility for the safety of the operation.

5. Origin and Approval of Reports.

It is important that adequate records be kept of the studies made, problems considered, conferences held, and approvals given.

In general, files will be maintained of minutes of conference and committee meetings on Special Hazard problems. Reports containing studies of proposed changes or studies of equipment and procedures from the standpoint of Special Hazards shall be sent through the Director of Field Operations to the Approval Committee. All reports sent to, or received from the Consultants Committee shall be handled by Dr. Beck, of the Approval Committee. Periodic reports of all important activities in Special Hazards, approvals given, meetings held, etc., shall be submitted to the K-25 Special Hazards Committee by its chairman, and, if approved, to the Plant Superintendent for transmittal to the Atomic Energy Commission.

6. Activities During March and April.

The chief Special Hazard activities at K-25 during March and April may be summarized thus:

a. Discussions and decisions leading to establishment of organization and functions described above (Appendix I).

b. Six meetings have been held with members of the Consultants Committee. This includes one meeting at which all members of the committee were present, as well as a number of Carbide's Division Superintendents. Copies of the minutes of these meetings are attached to this report in Appendix II.

c. A number of minor proposals have been studied and approvals given. Copies are attached in Appendix III.

d. Studies have been made of three important problems and reports are being written for submission to the Consultants Committee for consideration of hazards involved:

1. Seal Exhaust System.
2. Plant I Surge-for-Purge System: Safe Cold Trap Sizes.
3. Tolerance Limits on Uranium Contamination.

e. A sub-committee of the Plant Radiation Hazards Committee, composed of Mr. Visner, Dr. Costello, and Mr. Daniel, has been asked to study the problem of establishing methods for determining the amount of uranium ingested (if any) by personnel in the plant. The study is in progress.

f. Several meetings were held of the Special Hazard and Diversion Control Committee (now superseded by the Plant Radiation Hazards Committee). Among the items considered and discussed were:

1. Hazards associated with presence of U-234.
2. Possibility of automatic control of factors leading to condensation in the cascade.
3. Effects of changing motor frequency.

7. Projected Activities:

Completion of the work outlined in 6 (d) will be accomplished. Attempts will be made to improve the efficiency and coordination of efforts in the Special Hazard organization. Continued efforts will be exerted along the lines indicated in Appendix I.

CKB:ijc

APPENDIX I

RADIATION HAZARDS ORGANIZATION

Plant Superintendent
C. E. Center

FUNCTIONAL ORGANIZATION

Ass't Plant Sup't.
S. C. Barnett

Chairman of K-25 Special Hazards Committee
C. K. Beck

Director of Field Activities in Radiation Hazards
S. Visner

Functions
1. Direct and coordinate activities of Plant Radiation Hazards Committees.
2. Direct campaign of plant education in factors involving Radiation Hazards.

Critical Mass Unit
L. Galanter

Health Physics Unit
G. Selvin

APPROVAL COMMITTEE

K-25 Special Hazards Committee

C. E. Center	W. B. Humes	G. T. E. Sheldon
C. K. Beck, Chairman	F. W. Hurd	J. A. Marshall
S. C. Barnett	M. J. Costello	R. W. Cook
S. Cromer	F. R. Dowling	M. G. Means
A. P. Huber		S. Visner, Sec'y.

Functions
1. To review decisions on plant problems affecting Radiation Hazards.
2. To review all work on Radiation Hazards in the Plant.
3. To set policy on the handling of Radiation Hazards problems.

Approval Committee on Radiation Hazards
C. K. Beck
S. Cromer
S. Visner

Functions
1. To give approval and render decisions on problems and proposed changes in plant design, equipment and operating practices that involve Radiation Hazards considerations.
2. To refer appropriate problems to the consultant committees on Radiation Hazards for final approval.
3. To submit periodic reports to the A.E.C. on Radiation Hazards developments in the plant.
4. S. Visner, the Director of Field Activities on Radiation Hazards can give approval on problems, for which precederts have been set, subject to later review by the whole committee.

CONSULTANTS COMMITTEE
L. W. Nordheim, Chairman
E. T. Booth
R. P. Feynman
E. Greuling
P. Morrison
W. J. Ray
E. Shapiro
A. H. Snell

Plant Radiation Hazards Committee

S. Visner - Chairman	A. A. Abbatiello	- Engineering Dev. Division
R. G. Jordan)	A. D. Callihan	- Research Laboratories
J. A. Marshall) Process	R. W. Levin	- Uranium Control & Inspection Dept.
E. D. Flickinger)	L. Galanter	- Secretary

Functions
1. To prepare studies for presentation through the chairman to the Approval Committee of all proposed changes in plant design, equipment, and operating practice that may affect the safety of the plant.
2. To review present plant equipment, and operating practice with the objective of improving the safety of the plant wherever possible or feasible.
3. Each member is responsible for informing the Committee of any proposed changes and any existing situations that may require consideration by the Committee.
4. Individual members will accept responsibility for conducting investigations and studies that may be needed for making recommendations. Members will secure the assistance of the groups they represent.
5. To discuss progress on studies and investigations.
6. The Committee may call in additional persons as desirable to sit in on meetings and assist in preparing studies of particular problems.

APPENDIX II

Consultant Committee on K-25 Safety

Minutes of Meeting on February 17, 1947

The Local Consultants Committee on K-25 Safety, consisting of Nordheim, Snell, Greuling, Shapiro and Ray from X-10, met with Rucker, Sheldon, Beck and others of K-25 on February 17, 1947 to discuss the scope of the committee and to become somewhat familiar with the problems involved in operating the K-25 Plant.

About half a day was spent in discussing the general problems relating to the K-25 Plant, the basic principles of operation, and the apparatus and materials used in operating the Plant. Half an hour or so was spent in a quick tour of the Plant and plans were made for a more detailed tour at a later date.

Dr. Beck was requested by Mr. Rucker and Mr. Center to act in liason capacity between the consultants and the interested Carbide personnel; to arrange for meetings of the consultants as necessary; to furnish information to the committee; to discuss safety problems with the committee; and to secure information and decisions from the consultants.

Four or five reports describing the Special Hazards problem in the K-25 Plant were transmitted through Lt. Col. R. W. Cook's office to Dr. Nordheim of the Committee. It was decided that the Committee should study these reports and contact Dr. Beck for additional information if necessary, and then come together within a week or two to formulate plans for further action as appears feasible.

Clifford K. Beck
Chairman, K-25 Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Dr. G. T. Felbeck
Mr. S. C. Barnett
Mr. G. T. E. Sheldon
Mr. S. Visner
Lt. Col. R. W. Cook (2)

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UNITED STATES
ATOMIC ENERGY COMMISSION

Copy to: Dr. C. K. Beck
Mr. S. C. Barnett
Mr. A. P. Huber
Mr. G. T. E. Sheld
Mr. S. Visner

Oak Ridge, Tennessee
February 28, 1947

Carbide and Carbon Chemicals Corporation
Post Office Box P
Oak Ridge, Tennessee

Attention: Mr. C. E. Center

Subject: CONSULTANTS FOR COMMITTEE ON SAFETY OF K-25-27 OPERATION

Gentlemen:

Attached for your information is a copy of a memorandum to the Operations Officer, X-10 requesting that the necessary authorization be provided to Monsanto Chemical Company to permit the use of the group of scientists requested by your company to act as part of the committee of consultants on safety matters in the K-25-27 Plant.

This committee should be furnished through this office such information as may be necessary to permit them to serve in this capacity.

Very truly yours,

ATOMIC ENERGY COMMISSION

N. Randolph Archer
Major, Corps. of Engineers
Exec. Off., K-25 Division

1 Incl.
Cy. Memo. dtd. Feb. 24,
1947 fr. Co. Kromer to
Col. Leber

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February 24, 1947

Lt. Col. W. P. Leber, Operations Officer X-10

P. F. Kromer, Jr., Colonel Corps of Engineers
Deputy Manager, Field Operations
CONSULTANTS FOR COMMITTEE ON SAFETY OF K-25-27 OPERATION

AECZ

1. In accordance with the recommendation of the General Advisory Committee, Dr. George T. Felbeck and Mr. Clark E. Center of Carbide & Carbon Chemicals Corp. were requested to explore the possibility of utilizing the services of Dr. Wigner and scientists of his group at Clinton Laboratories to act as consultants to Carbide in advising on safety questions.

2. These preliminary contacts have been completed and Carbide and Carbon Chemicals Corp. desire to utilize the services of Drs. L. Nordheim, A. H. Snell, E. Grueling, E. Shapiro, and J. Ray as members of a committee of consultants, which also includes Drs. Morrison, Feynman, and Booth, to advise on safety problems at the K-25-27 Plant. They also desire to utilize the services of Dr. Wigner as special consultant to this group.

3. The utilization of members of Dr. Wigner's group at Clinton Laboratories to act as consultants to the Carbide & Carbon Chemicals Corp. on matters of safety of the K-25-27 operations has the approval of the Atomic Energy Commission. It is requested that the Monsanto Chemical Company be given the necessary authorization to make the services of the above named scientists available to the K-25-27 Plant for periodic inspections and meetings as necessary to perform the additional duties as consultants on matters pertaining to safety.

4. The Carbide & Carbon Chemicals Corp. is being authorized to furnish this committee with such information as may be necessary to permit them to serve in this capacity.

APPENDIX II (Con'd)

Consultant Committee on K-25 Safety

Minutes of Meeting on March 7, 1947

Present from X-10: Nordheim, Snell, Greuling, Shapiro, and Ray.

Present from K-25: Beck, Cromer, Rucker, Visner, and Sheldon.

The group assembled at 9:00 A.M., on Friday, March 7, and for two hours discussed the general problems relating to safety in the K-25 plant. The remainder of the morning was spent in a tour of inspection of various parts around the K-25 plant including feed station, waste withdrawal, product withdrawal, purge buildings, a typical cell in the separating cascade, and other points of interest.

The group met Mr. Center and a number of other Carbide Supervisors in the cafeteria for lunch.

After lunch, installations in the Conditioning Building were visited including a survey of the retubing area and observation of details of converter construction and pump and seal construction. The inspection ended about 4:00 P.M.

The primary purpose of this meeting was to educate the committee into the nature and scope of operations at K-25 and the attendant problems relating to critical mass. It was decided that Dr. Beck should arrange for another meeting within two weeks to discuss with the committee more detailed problems concerning the Special Hazards problem in the K-25 plant.

Clifford K. Beck
Chairman, Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Dr. G. T. Felbeck
Mr. S. C. Barnett
Mr. G. T. E. Sheldon
Mr. S. Visner
Lt. Col. R. W. Cook (2)

APPENDIX II (Cont'd)

Consultants Committee on K-25 Safety

Minutes of Meeting on Sunday, March 23, 1947

Present: Dr. E. Teller, Dr. R. P. Feynman, Dr. H. M. Roth, Dr. Clifford Beck, Mr. S. Visner.

Dr. Beck was informed by Dr. Roth, of the District Research Office that Dr. R. P. Feynman, member of Carbide's Consultant Committee on K-25 Safety, would be on the area March 22 and 23rd on consultant work with the District and could possibly be made available for a short conference with Carbide if such were desired. Dr. Beck stated that a conference was desired, and asked to be informed of the time and place if one could be arranged.

A 30 minute conference was scheduled on Sunday Morning, March 23, in Dr. Roth's office between Feynman, Roth, Beck, Visner, and E. Teller. (The latter was formerly very much involved in calculations of safety problems in K-25 and at one time or another issued the major safety rules and limitations still in use).

Dr. Beck informed Dr. Feynman of the present status of the Local Consultants Committee (Nordheim, Ray, Shapiro, Greuling, Snell) and the results of the two meetings held thus far; and of the nature and scope of activity conceived for the General Consultants Committee (Feynman, Morrison, Booth, plus the five Local Committeemen). The latter, as conceived, falls into two general categories:

a. Consulting service on specific problems encountered by K-25 personnel and presented to the Committee for decisions. In this, the initiative rests with the K-25 personnel.

b. General survey of K-25 operations by the Committee to insure that dangerous procedures or possibly dangerous situations, overlooked by the K-25 personnel, do not exist. In this, the initiative rests with the Consultants Committee.

Dr. Teller related some of the pertinent facts in the history of Special Hazards considerations at K-25 and emphasized the need for continued efforts in both categories above. He offered any assistance he could give to the consultants on problems which might arise.

It became apparent, as the conversation proceeded, that Dr. Feynman should secure considerably more information concerning the K-25 operations, subsequent to which he should have further discussion with Dr. Teller. His plans, therefore, were changed to permit an extra day

APPENDIX II (Cont'd)

in Oak Ridge. Dr. Feynman spent Sunday afternoon in the Carbide Research Laboratory office with Dr. Beck and Mr. Visner, reading reports and discussing matters relating to Special Hazard problems. On Monday morning, Dr. Feynman discussed with Dr. Teller a number of problems, and the background information relating thereto, concerning Special Hazards at K-25.

Tentative plans were laid for a meeting of the entire Consultants Committee in April. Dr. Beck will contact all members and attempt to crystallize plans for such a meeting.

Clifford K. Beck
Chairman, Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Dr. G. T. Felbeck
Mr. S. C. Barnett
Mr. G. T. E. Sheldon
Mr. S. Visner
Lt. Col. R. W. Cook (2)

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APPENDIX II (Cont'd)

Consultants Committee on K-25 Safety

Minutes of Meeting on March 27, 1947

PRESENT on March 27 in Dr. Roth's office: Dr. P. Morrison, Dr. Clifford Beck

Dr. Roth, of the District Research office, called Dr. Beck on the morning of March 27, saying that Dr. P. Morrison, Carbide consultant on Special Hazards, was expected in Oak Ridge for an overnight visit on A.E.C. business, but might be able to discuss K-25 problems briefly, if it were so desired. An arrangement was made that Dr. Beck should meet Dr. Morrison at 4:30 PM in Dr. Roth's office.

Dr. Beck discussed with Dr. Morrison the present status of the Consultant Committee of K-25 on Critical Mass problems, the activity of the Local Committee thus far, and the scope and nature of the activities conceived for the Committee. The latter, as conceived, falls into two general categories:

a. Consulting service on specific problems encountered by K-25 personnel and presented to the Committee for decisions. In this, the initiative rests with the K-25 personnel.

b. General survey of K-25 operations by the Committee to insure that dangerous procedures or possibly dangerous situations, overlooked by the K-25 personnel, do not exist. In this the initiative rests with the Consultant Committee.

Various problems relating to safety in the K-25 plant were discussed. Dr. Morrison was invited to a meeting of the Local Consultants at 9:00 AM the following day. He agreed to attend.

Clifford K. Beck
Chairman, Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Mr. S. C. Barnett
Dr. G. T. Felbeck
Lt. Col. R. W. Cook (2)
Mr. S. Visner

UNCLASSIFIED

APPENDIX II (Cont'd)

Consultants Committee on K-25 Safety

Minutes of Meeting on March 28, 1947

PRESENT: Dr. L. W. Nordheim, Dr. J. Ray, Dr. E. Shapiro, Dr. E. Greuling, Dr. A. H. Snell, Dr. P. Morrison, Mr. S. Visner, Mr. G. T. Sheldon, Mr. J. L. Waters, and Dr. Clifford Beck.

This meeting, held at X-10 at 9:00 AM, was requested by Dr. Beck for consideration of three specific problems relating to safety at K-25.

1. Seal-exhaust Carbon Traps

The details of the seal exhaust system were presented, the normal operating conditions and procedures, and all the abnormal circumstances and events which could be thought of were discussed. It was generally agreed that under all normal operations, and most conceivable abnormal circumstances, the traps were perfectly safe. Under one remotely possible set of conditions, which might occur, though it isn't certain that this could occur, it was conceived that a possible hazardous condition might result. This is to be investigated further by K-25 personnel, and then a statement of all factors and conditions relating to the problem are to be presented to the Consultants Committee for a decision on safety.

2. "Always-Safe" pipe sizes; Cold-traps

The official rules regarding uses of pipe in general, (Hoyt, Jan., 1946) were reviewed and the need for revision and extension was indicated. For example, the present rules are stated for concentrations up to one-third of the concentration at which the plant is now operating.

The statement of this problem, with a list of all factors relating thereto, is to be presented in writing by K-25 personnel to the Committee for a decision.

3. Tolerance limits of Uranium Contamination

It was pointed out that K-25 encounters the problem of uranium contamination as a factor in plant health hazards at two places; in the atmosphere near the site of prior uranium compound spills, and on the surface of tools, containers, and equipment which have come in contact with uranium compounds. The tolerance limits are, in many cases, rather ill-defined and information available at K-25 is very inconclusive as to the real danger which exist or the limits at which danger begins.

APPENDIX II (Cont'd)

In the discussion of these problems, principally by Dr. Ray, of the Committee, the lack of clarity regarding factors contributing to this problem was re-emphasized: A statement of K-25's interest in this problem, and what information is desired, is to be presented to the Committee, for further study.

Dr. Beck informed the members present that a meeting of all the Consultants was being planned for April 10, 11 and 12, at K-25. Dr. Nordheim stated that his group could be present and Dr. Morrison so stated also. Final plans will be conveyed to the various members by Dr. Beck.

Clifford K. Beck
Chairman, Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Mr. S. C. Barnett
Dr. G. T. Felbeck
Lt. Col. R. W. Cook
Mr. Sidney Visner

APPENDIX II (Cont'd)

Consultants Committee on K-25 Safety

Minutes of Meeting of April 10 and 11, 1947

Present: E. T. Booth, R. P. Feynman, P. Morrison, L. N. Nordheim, J. Ray, E. Shapiro, S. C. Barnett, C. K. Beck, C. E. Center, A. P. Huber W. H. Rogers, F. Shafran, G. T. E. Sheldon, S. Visner.

This was the first occasion upon which all members of the two consultants groups could be present. The meeting was called to acquaint the consultants with the situation of K-25, to discuss the chief problems relating to special hazards, and establish a working relationship between the consultants and K-25.

Mr. C. E. Center reviewed the problem of Radiation Hazards at K-25 and the sequence of events, culminating in the decision to raise product purity at the plant, that brought about the formation of Consultants Committees of physicists.

Dr. C. K. Beck outlined the function of the Consultant Committee as follows:

A. To render consulting service on specific problems encountered by the K-25 organization and presented to the Committee for decisions. The initiative, in this, would rest with K-25 personnel.

B. To survey plant operations to insure that possibly hazardous situations have not been overlooked by K-25 personnel. In this case, the initiative rests with the consultants. Mr. C. E. Center explained that the consultants were to do as much as their time permitted on this phase of the work.

The problems to be discussed with the Committee would be of two types:

1. Specific problems that are clearly defined; e. g., withdrawal of product in cylinders.

2. Plant policy; e. g., safe operating temperatures and pressures, margins of safety.

The K-25 organization for the following Radiation Hazards work (Appendix I) was described. It was pointed out that in addition to the Critical Mass work, Mr. Visner directs the Radiation Health Survey activities.

A proposal was adopted that the two Consultant Committees be merged, with Dr. L. N. Nordheim as Chairman.

A discussion followed of plant Radiation Hazards problems. The three problems, already discussed with the X-10 group, were described:

A. Seal exhaust systems. The statement of the problem including pertinent factors and conditions is being prepared for presentation.

B. "Always Safe" pipe sizes; cold traps. The official rules on "always safe" pipe sizes in general need reviewing and extension. No rules exist at present for concentrations above one-third of present plant product purity. In particular, a study has been prepared of Plant I Surge for Purge System including the cold traps.

C. Tolerance limits of uranium concentration. The problem of uranium contamination has arisen as a factor in plant health hazards due to alpha activity. Information is being gathered for presentation.

Condensation and Safe Temperatures

The problem of safe temperatures and pressures was discussed, Mr. A. P. Huber outlined the conditions prevalent in the upper sections of the plant. At normal operating conditions, condensation appeared extremely unlikely. Two exigencies can arise:

1. Short time pressure rises of 1 or 2 pounds due to inleakage.

2. Pressures of 5 to 7 psia can be reached should a control valve stick in a closed position.

The various alarms and indicators were described which would bring about the relief of the abnormal condition in a very short time. Buildings can be isolated in a very short time. Mention was also made of the work on automatic cell by-pass and motor overload devices.

Dr. E. T. Booth raised the possibility of a cold spot developing during normal operation. This was thought very unlikely.

Accumulations

Dr. P. Morrison inquired as to the possibility of solid reaction products (UF_4 and UO_2F_2) depositing.

It was pointed out that large quantities would be required in order to constitute a problem for the following reasons:

1. Under plant conditions these compounds have a low bulk density. The introduction of large quantities of water into cascade would be required.

2. Impurities are carefully monitored by means of the Line Recorders.

It was the opinion of those present that the more likely hazards in the cascade would require the presence of hydrogen. It was also agreed that the introduction into the cascade of water or other hydrogen containing material appeared remote.

Chain Reaction

Dr. P. Morrison described the probable results of a chain reaction. Conditions for an explosion appear extremely unlikely; a slow boiling being more likely. A reaction that would release one kilowatt hour of energy would be equivalent approximately to a million curie source.

1. The radiation would be the greatest hazard.

2. The spread of radioactive materials would present an extreme contamination problem.

3. A shut-down of the plant for several months would be likely.

4. Morale factors might effect future operation.

The need for emergency procedures for treating exposed personnel was pointed out by Dr. P. Morrison. Mr. C. E. Center stated that Dr. Kammer would be available for assisting such a program. Dr. Ray stated that the X-10 staff would be available in an emergency. It was suggested that X-10 and K-25 establish a working agreement on mutual help.

All agreed that in case of a chain reaction, the entire plant should be shut down to limit the spread of radioactive materials.

Plant Inspection

The consultants indicated their desire to inspect Plant I Cold Traps, Seal Exhaust systems, recovery and decontamination operations, and radiation monitoring equipment.

The meeting adjourned at 10:30 AM.

The above mentioned points in the plant were inspected by the consultants, escorted by K-25 personnel. The entire group assembled for lunch at the cafeteria at 12:30 PM.

During the afternoon, Drs. R. P. Feynman, P. Morrison, met with Messrs. G. T. E. Sheldon and S. Visner at the latter's office to discuss

emergency radiation procedures. The present procedure for radiation monitoring and evacuation of personnel was considered satisfactory. The following suggestions were made by the consultants:

1. A provision for checking adjacent radiation rate meters should be incorporated in the procedure in order to provide a rapid check on an individual rate meter alarm.

2. Film badges should be attached to the 263 survey meters in order to measure the total radiation received by the individual monitoring an affected area.

3. Liason with X-10 health group should be effected for the purpose of establishing facilities for monitoring the exposure and injury to affected personnel.

The importance of setting up adequate procedures for medical treatment of exposed personnel was again stressed.

Drs. Feynman and Morrison met on Friday morning, April 11, in Dr. Beck's office for further discussion of various plant operations. Mr. Huber, Mr. Barnett, Mr. Olson, Mr. Jordan, Mr. Schwenn, Mr. Visner and Dr. Beck were also present.

The problem of safe stage and coolant temperatures in the upper sections of the plant was reviewed again. The consultants were of the opinion that small changes in operating temperatures should not materially affect the safety of the plant, on the grounds that even if minor condensations of C-616 on the coolant tubes should occur, the presence of moderating material should not be expected, hence the situation would not be hazardous.

The Plant I purge system was discussed. The following suggestions were made:

1. Although it appears that higher assays could be safely handled, the present assay limit of 4495006% for the 8" cold trap should be kept until experimental data becomes available.

2. The boundary valves on the purge for surge system that separate high and low assay material should be isolated on a semi-permanent basis, as for example; tack welding, removal of mechanism from the valve, and cutting and blanking off lines wherever feasible.

The consultants were of the opinion the handling of material during decontamination and recovery could possibly present a hazard in the absence of proper care. For example, the dipping of equipment into the decontamination tanks in K-1303 may create a hazard should a particular item contain an excessive quantity of uranium. The following were recommended:

A. A visual check should precede the operation of dipping into the tanks to locate any large accumulations.

B. The development of uranium accumulation detectors should be pushed.

C. The possibility should be considered of introducing a neutron poison in the decontamination solution as an additional safeguard.

The deposition of corrosion products in K-312 cells was discussed. That these quantities were much greater than elsewhere in the plant caused some concern. Mr. A. P. Huber pointed out that plans were being considered to eliminate the need of the K-312 Section by specifying the use of cold traps instead.

The meeting adjourned at 11:00 AM.

Clifford K. Beck
Chairman, Special Hazards Committee

CKB:ijc
cc: Mr. C. E. Center
Mr. S. C. Barnett
Dr. G. T. Felbeck
Lt. Col. R. W. Cook
Mr. S. Visner

UNCLASSIFIED

APPENDIX III

To: Mr. S. C. Barnett
Location: K-1001

Date: April 9, 1947

Copies to: Dr. C. K. Beck
Mr. C. E. Center
Lt. Col. R. W. Cook
Mr. S. Cromer
Mr. A. P. Huber
Mr. S. Visner
Plant Records

Subject: Plant Feed Rate

A proposal for changing the plant feed rate to 5500 pounds normal UF_6 per day has been considered from the Radiation Hazards aspect. The present daily feed rate is 4200 pounds normal UF_6 and 3200 pounds depleted UF_6.

According to your letter of April 5, 1947, to the U. S. Atomic Energy Commission, an increase in daily feed rate from 4200 pounds to 5500 pounds of normal C-616 will produce only very slight increases in Plant concentration gradient and building inventories of X. In the case of the latter, the increase for building is both 0.05 kg. for the top sections and 0.5 kg. for the bottom sections. The proposal under consideration should result in a smaller change, since the present feed rate is intermediate to the two considered in the above mentioned letter.

All other factors remaining the same, the proposed change in feed rate should not introduce any additional hazard; and it is therefore approved.

Approval is also granted to an interim daily feed rate of 4200 pounds normal UF_6 and up to 7300 pounds depleted UF_6. According to a letter of April 8, 1947, from G. A. Garrett to the writer, such a feed schedule also would result in a very slight increase in gradient and building inventories.

APPROVAL COMMITTEE ON RADIATION HAZARDS

C. K. Beck S. Cromer S. Visner

SV:ljh:ijc

UNCLASSIFIED

SECRET

APPENDIX III (Cont'd)

To: Mr. S. C. Barnett
Location: K-1001

Date: April 15, 1947

Copies to: Dr. C. K. Beck
Mr. C. E. Center
Lt. Col. R. T. Cook
Mr. S. Cromer
Mr. A. P. Huber
Mr. S. Visner

Subject: Plant Feed Rate

The proposal for changing the plant feed rate to 6000 pounds UF_6 per day has been considered from the Radiation Hazards aspect. According to your letters of April 5, 1947, and April 9, 1947, to the U. S. Atomic Energy Commission the resultant increase in plant concentration gradient and building inventories of "X" is very slight.

All other factors remaining the same, the proposed feed rate should not introduce any additional hazard; and it is therefore approved.

APPROVAL COMMITTEE ON RADIATION HAZARDS

C. K. Beck | S. Cromer | S. Visner

SV:ljh:ijc

MINUTES OF MEETING

K-25 SPECIAL HAZARDS COMMITTEE

April 25, 1947
10 A.M.

K-1001 Conference Room

Present

S. C. Barnett
C. K. Beck
R. W. Cook (Lt. Col.)
M. J. Costello
S. Cromer
G. T. Felbeck
A. P. Huber
W. B. Humes
F. W. Hurd
J. A. Marshall
M. G. Means
W. H. Rogers
S. Visner

The committee meeting was held for the purpose of discussing the new Special Hazards Organization at K-25 and for approving the progress report to be submitted to the U. S. Atomic Energy Commission. The progress report to the Atomic Energy Commission had been distributed to the committee as an agenda for the meeting.

Dr. Beck, chairman of the Special Hazards Committee, opened the meeting, stated the purpose of the meeting, and called attention to the seven items on the agenda, listed on the first page of the report.

1. Scope of Special Hazards Activities; Requirements to be met.

The first item was discussed, with no suggestions being made for alterations.

2. Organization.

There was considerable discussion of the proposed organizational and functional arrangement, (Appendix I). It was agreed that:

A. The scope of Special Hazards activities would include hazards associated with radioactive materials.

B. The K-25 Special Hazards Committee should review and approve the monthly report to the Atomic Energy Commission.

C. The Plant Radiation Hazards Committee should function as a fact-finding, information gathering, report writing group concerned with studying problems falling in the scope of Special Hazards and presenting the information, through their chairman, to the Approval Committee for decision. Interested parties on or off the Committee could accompany the chairman in presenting the information to the Approval Committee if desired.

3. Role of Consultants.

No comments, except Dr. Felbeck suggested that the Consultants should visit K-25 at least twice per year. Initial action in arranging these visits was considered Carbide's responsibility.

4. Problems to be considered by the Special Hazards Organization.

In discussing the scope of Radiation Hazards activities, Messrs. J. A. Marshall and A. P. Huber requested that limits be set within which plant operations could vary cascade conditions without approval of the Radiation Hazards Organization, especially in the case of an emergency. It was agreed that in so far as possible this would be accomplished:

A. By studying normal operating fluctuations and approving limits within which operations would be safe, and,

B. By preparing emergency procedures to cover all exigencies securing approval in advance for these procedures.

5. Origin and Approval of Reports.

6. Activities during March and April.

7. Projected Activities.

These items were subjected to discussion, but no suggestion for change was made.

The Committee voted approval of the report for presentation to the Atomic Energy Commission.

S. Visner
Secretary, K-25 Special Hazards Committee

SV:CKB:ijc